

AMENDMENTS TO THE CLAIMS

Claim 1 (Cancelled).

2. (Currently Amended) ~~The~~An optical transmission module ~~according to~~ ~~claim 4~~ which sends and receives light transmitted bi-directionally through an optical fiber, said optical transmission module comprising:

a light source which radiates light of a first wavelength;
a light-detecting section which detects light of a second wavelength emitted from the optical fiber; and

a binary diffractive optical element with a staircase-shaped diffractive surface, which has principal diffractive action of different diffraction orders respectively for the light of the first wavelength and the light of the second wavelength, wherein

said diffractive optical element separates a first optical axis passing from said light source to the optical fiber and a second optical axis passing from said light-detecting section to the optical fiber, wherein

said diffractive optical element bends one of the light of the first wavelength and the light of the second wavelength by diffraction, and does not bend light not bent by zero order diffraction,

one of the first wavelength and the second wavelength is a wavelength in a 1.3 μ m wavelength band and the other wavelength is in a 1.55 μ m wavelength band, and

said staircase-shaped diffractive optical element includes at least five steps and no more than eight steps.

3. (Currently Amended) The optical transmission module according to ~~claim 4~~10, wherein said diffractive optical element diffracts the light of the first wavelength and the light of the second wavelength with diffraction orders of

mutually opposite signs, so that the light of the first wavelength and the light of the second wavelength are bent toward mutually opposite directions.

4. (Currently Amended) The optical transmission module according to claim ~~4~~10, wherein said diffractive optical element converges one of the light of the first wavelength from said light source onto the optical fiber, and the light of the second wavelength from the optical fiber onto said light-detecting section, and the light converged has a center that is eccentric from one of a straight line passing ~~from~~from said light source to the optical fiber, and from a straight line passing from the optical fiber to said light-detecting section.

Claim 5 (Cancelled).

6. (Currently Amended) The optical transmission module according to claim ~~4~~10, wherein said diffractive optical element is a transmission diffractive optical element.

7. (Currently Amended) The optical transmission module according to claim ~~4~~10, wherein said diffractive optical element is a reflection diffractive optical element.

Claim 8 (Cancelled).

9. (Previously Presented) The optical transmission module according to claim 3, wherein one of the first wavelength and the second wavelength is a wavelength in a 1.3 μ m wavelength band and the other wavelength is in a 1.55 μ m wavelength band, and said staircase-shaped diffractive optical element has eight steps.

10. (Currently Amended) ~~The~~An optical transmission module ~~according to~~ ~~claim 4~~ which sends and receives light transmitted bi-directionally through an optical fiber, said optical transmission module comprising:

a light source which radiates light of a first wavelength;
a light-detecting section which detects light of a second wavelength emitted from the optical fiber; and

a binary diffractive optical element with a staircase-shaped diffractive surface, which has principal diffractive action of different diffraction orders respectively for the light of the first wavelength and the light of the second wavelength, wherein

said diffractive optical element separates a first optical axis passing from said light source to the optical fiber and a second optical axis passing from said light-detecting section to the optical fiber, wherein

said diffractive optical element comprises a first diffractive optical element and a second diffractive optical element,

said first diffractive optical element converges the light of the first wavelength from said light source onto the optical fiber and transmits the light of the second wavelength from the optical fiber, and

said second diffractive element converges the light of the second wavelength from the optical fiber onto said light-detecting section and transmits the light of the first wavelength from said light source.

11. (Currently Amended) ~~The~~An optical transmission module ~~according to~~ ~~claim 4~~, ~~further~~ which sends and receives light transmitted bi-directionally through an optical fiber, said optical transmission module comprising:

a light source which radiates light of a first wavelength;
a light-detecting section which detects light of a second wavelength emitted from the optical fiber;

a binary diffractive optical element with a staircase-shaped diffractive surface, which has principal diffractive action of different diffraction orders respectively for the light of the first wavelength and the light of the second wavelength, wherein said diffractive optical element separates a first optical axis passing from said light source to the optical fiber and a second optical axis passing from said light-detecting section to the optical fiber; and

a lens which converges and bends light from said light source toward the optical fiber and converges and bends light from the optical fiber toward said light-detecting section, wherein

 said diffractive optical element converges and bends the light of the first wavelength from said light source onto the optical fiber and transmits the light of the second wavelength from the optical fiber, or, alternatively,

 said diffractive optical element converges one of the light of the first wavelength from said light source onto the optical fiber, and the light of the second wavelength from the optical fiber onto said light-detecting section,

said diffractive optical element converges one of the light of the first wavelength from said light source onto the optical fiber, and the light of the second wavelength from the optical fiber onto said light-detecting section, and

the light converged has a center that is eccentric from one of a straight line passing from said light source to the optical fiber, and from a straight line passing from the optical fiber to said light-detecting section.

12. (Previously Presented) The optical transmission module according to claim 10, wherein said first diffractive optical element and said second diffractive optical element are respectively disposed on two opposed surfaces of a single member, facing in opposite directions.

Claim 13 (Cancelled).

14. (Currently Amended) The optical transmission module according to claim ~~5~~10, wherein said diffractive optical element is disposed on a surface of said lens.

15. (Previously Presented) The optical transmission module according to claim 11, wherein said diffractive optical element has eccentric non-spherical converging action.

16. (Currently Amended) The optical transmission module according to claim ~~4~~10, wherein said light source and said light-detecting section are arranged on a single substrate, said substrate and said diffractive optical element being housed in a single sealed package.

17. (Currently Amended) The optical transmission module according to claim ~~4~~10, wherein an electrical signal sent to said light source and an electrical signal received from said light-detecting section cancel each other, so that mutual electrical cross talk is eliminated.

18. (Currently Amended) The optical transmission module according to claim 10, wherein one of the first wavelength and the second wavelength is a wavelength in a 1.3 μ m wavelength band and the other wavelength is in a 1.55 μ m wavelength band, and said staircase-shaped first diffractive optical element has ~~5~~five or ~~6~~six steps, and said staircase-shaped ~~said~~second diffractive optical element has ~~7~~seven steps.